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JULY, 1925

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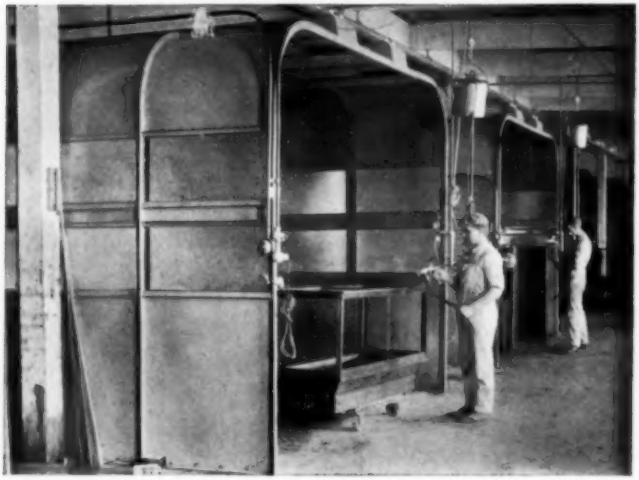

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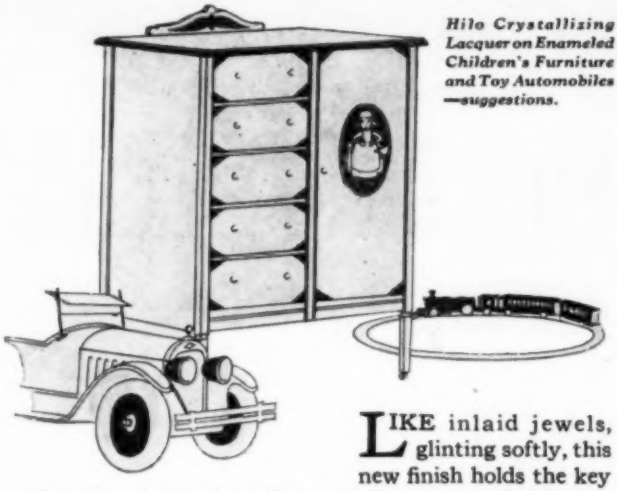

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# Industrial Finishing

## For Users of Fillers, Shellacs, Varnishes, Etc.

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# With the Editor

IF you can remember back when horses had not yet been displaced by automobiles, trucks and tractors, you will recall that when in service, their heads were bridled and their eyes side-blindered to make them work a certain way and see only in one direction. Now it has been suggested that some men, even to this day, work and act as though their minds were similarly confined. At least a certain university professor intimated as much recently when he addressed his 1925 graduating class on the subject of "blinders". He declared that deep-seated superstitions, beliefs, taboos and prejudices were blinders put on us, or "put on by others for us, to keep us from seeing in all directions—to force us to see only a part and a chosen part of our surroundings."

"Our eyes are directed backward more than forward," he said, "in much of the educational process which is used to develop trained men for the days ahead."

The professor added: "The fundamental elements in man's environment have not changed, yet man has so changed this environment that we have a new world. Man's curiosity, his unquenchable fighting qualities, his co-operative spirit, combined with the use of thought, have given him such success as is his. Above all there have always been daring men who could not and would not be baffled by the unknown."

"To meet facts square on, without blinders, is a sign of education."

These are valuable and timely remarks, not only for university graduates but for graduates and near graduates in the school of industrial experience. They contain a reminder and a lesson for industrial finishers, purchasing agents and executives.

In matters of industrial finishing, whether it be methods or materials, men or equipment, it is the avowed purpose of INDUSTRIAL FINISHING to remove the "blinders" and acquaint its readers with what is new, dependable and worth while. Questions on any phase of your finishing work are always welcome. The comments, suggestions and questions we receive help us to edit this magazine and make it a better journal for you.

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# Development of Lacquers

*Revealing how nitro-cellulose lacquer was first discovered, what it consists of, and why it did not come into extensive use until very recent years*

By A. M. Maher, S. B.

WITH THE appearance of pyroxylin lacquer enamel as perhaps the greatest finish yet produced for durability, what impresses us most in its history is the solution of the problem of solvents.

**The Discovery.**

To Schoenbein, a Swiss, goes the credit for the accidental discovery of nitro-cellulose as a base. While experimenting with nitric and sulphuric acid he broke his flask. Inasmuch as this was on the hearth of his home he took one of his wife's cotton aprons to wipe it up, and then hung the apron in front of his fire to dry. Upon drying it exploded with a flash. Being a chemist, he naturally became interested in the result and continued his experiments, and obtained patents on the process in 1846.

In 1833 two Frenchmen, Braconnot and Pelouze, prepared nitric starch by the action of strong nitric acid on starch. In 1848 Maynard discovered "colodion" for medicinal purposes. To most of us colodion is better known today as "new-skin." It is a solution of nitro-cellulose in ether alcohol.

**Proxylin Lacquer Patented.**

Alexander Parks was the first one to patent pyroxylin lacquers back in England in 1855. From this time on the difficulty has centered around trying to secure the right kind of solvents, and enough of them. It was not until 1911 that definite results were obtained, opening the way for real progress. It was discovered that when second or later cuts of cotton seed, known as linters, free from all impurities, were combined with sulphuric and nitric acid, nitro-cellulose or pyroxylin was produced.

The high viscosity of nitro-cellulose gives a tough and lasting film and the low viscosity gives great penetration and covering qualities, consequently, the correct degree of viscosity gives the ideal surface. Up to 1915 the only solvent used was amyl acetate which dissolved only from 8 to 10 per cent. of the cotton. By the time this was thinned down, only 3 per cent. of the cotton could be traced in the solution.

**Effect of Last War.**

The World War is really responsible in bringing about the further scientific advancement of nitro-cellulose. Enormous stocks of solvents were on hand for which there was no commercial use in peace time. Therefore, it was up to the manufacturers who had their money tied up in this material to find some outlet for these products. During the war, these solvents were applied to the wings of aeroplanes as a coating which made the wings taut, and prevented humidity and moisture from saturating the aeroplane linens.

This resulted in experimentation on a large scale. The main issue then was to reduce the viscosity of nitro-cellulose and also to try and get more of the cotton in solution. By 1918 chemists were able to make a solution containing as high as 40 per cent. of dry cotton. It then became a commercial product for commercial use.

In 1913 lacquers had a limited market, as they were only able to produce a film two-thousandths of an inch thick. This film was used on the face of telephone instruments, bedsteads and metal surfaces, in the preservation of silver, preparation of imitation leather, etc., but it never reached its development in the finishing field until within the past two years.

**Lacquer Solvents.**

With the increasing use of lacquers, it became necessary to find new solvents due to the scarcity of amyl acetate, which is made from fusil oil. Perhaps this product would seem more common if referred to as the ingredient in whiskey which makes one's nose red by irritating the corpuscles of the nasal membrane.

One hundred gallons of whiskey are needed to obtain three gallons of amyl acetate. This became impractical and new solvents had to be found. Then one concern, through a chemical process, inoculated corn mush and produced acetone and butyl alcohol from which butyl acetate is obtained. This company now markets this product on a large scale.

A little later, ethyl acetate was evolved. Little difficulty is experienced in obtaining this product. These solvents are all necessary in the present manufacture of lacquers. To these solvents are added non-solvents, namely, benzol, tolnol, zylol. These non-solvents not only serve to cut the cost of production, but they also prove responsible in controlling the rate of evaporation. These are all products of coal tar. Denatured alcohol is also used. In 1922 all these solvents were available and the production of lacquers began on a large scale.

**Highly Perfected Lacquers.**

Nitro-cellulose forms the base for certain lacquers to which are added gums, oils, and pigments. The gums consist of varnishes, shellacs and synthetic gums. The "softeners" or "plasticisers" are castor oil, camphor, rape seed oil, butyl tartrate, dubytl thallate, etc.

In order to produce its lacquer on a commercial scale, one nationally known concern has equipped the largest laboratories in the world with a staff of twenty chemical engineers. A world authority on lacquers is the director. Experiments are continually made to reveal new uses for the product. Everything is lacquered from doll heads and broom sticks to automobiles and surface cars. It takes less time, less labor and less floor space in its application than does ordinary paint. The article is ready for handling in less than an hour's time and air-dries in 10 to 15 minutes.

Lacquers are sprayed on, and the pressure used for correct application changes according to the materials used, the temperature of the room, etc. The distance at which the gun should be held varies between 6 and 8 inches.

With the matter of solvents now practically solved and sufficient quantities of them now

available, there seems to be no doubt but that lacquers are here to stay as one of, if not the greatest recent development in the field of industrial painting and finishing.

## Feeding Finish Directly From Drum.

In some finishing rooms it is customary to feed fluid finish directly from the steel shipping drum. This is generally done in establishments where large quantities of one kind of material are used in practically continuous production. The direct feeding saves taking small batches of material out of the drum repeatedly to fill a gravity-feed container, which must be hoisted and lowered for every refilling.

In many factories, however, both methods are employed at different times at the same spray booth. This condition obtains in the installation shown herewith, when small quantities of material are used the finish is placed in the overhead gravity-feed bucket, which appears in the upper left hand corner of this picture. On long runs the fluid is forced out of the drum by low air pressure (about 5 lbs.). Compressed air from the air line is introduced through a fitting to which is attached a pressure gage and pressure regulator.

Notwithstanding the use of these fittings it is general practice among the majority of foremen finishers to reinforce the drum heads from the outside, by applying center plates, cross braces and stay rods, as shown in this picture. The possibility of the drum heads bulging from excessive pressure is prevented by flat plates or shims wedged under 3-in. channel steel cross bars, there being a cross bar reaching diametrically across each drum head. The two cross bars for each drum are held from spreading farther apart by a pair of ⅝-in. retaining rods fitted with suitable washers and nuts.

Drum heads are braced on the outside and low air pressure is used.

Wherever this method of feeding is employed special precautions must be taken to reduce to a minimum all possibility of the air pressure going higher than is safe for all concerned. A number of accidents have resulted from carelessness or ignorance in the use of this method of feeding finish, but if it is always used carefully and intelligently at low pressure no danger need be feared. Since a great deal of reliance must be placed upon the accuracy of the pressure gage, the dependability of the regulator, and the proper connection of the apparatus to the drum, it is important that these appliances be of the best, and that they always be maintained in good working condition.—Edw. Thomas.

# Using Automobile Lacquer Finishes

*A disclosure of several important characteristics of automobile lacquer finishes, along with suggestions on the selection, preparation, application and final polishing of them*

By R. L. Masterson

THERE are a number of points which are important within themselves but which must be given close attention in order to secure good results with the use of lacquer materials in finishing automobiles. Failure to give consideration to these points may result in serious trouble.

### Stir Before Using.

Be careful to stir the contents of the package very thoroughly before taking any goods from it, as the various pigments used show different tendencies toward settling, and the true color will not be obtained if they are not thoroughly mixed before removing any material from the package. For example, a gray lacquer enamel, when the can is first opened, may have a cream shade; thorough stirring will reveal that the black pigment is near the bottom of the package, and when it has been thoroughly mixed with the other ingredients the true gray shade will be obtained.

On the other hand, consider what would happen if a portion of the contents were removed and used before being thoroughly stirred up. The portion first taken out would be extremely light in color while the portion remaining in the package, when thoroughly worked up, would be considerably darker in color than would be the case if the entire contents had been stirred up thoroughly before any material was taken from it. It must be seen from this that unless the contents are always thoroughly stirred, considerable trouble may be had in matching shades.

### Lacquer Enamel Reducer.

As a rule, the proper amount of reduction to give a lacquer enamel is about equal parts of enamel and reducer, although a great deal depends upon the lacquer enamel itself, the spraying equipment, the man behind the gun and other conditions. Sometimes better results will be secured if they are reduced to a greater extent—say about 40 parts lacquer enamel to 60 parts reducer. This greater reduction permits the enamel to go on more freely and consequently eliminates the amount of orange peel.

Only the lacquer reducer supplied and recommended by the manufacturer of the lacquer enamel should be used for reducing the lacquer enamel, for the reason that the ingredients of the reducer and of the enamel may not work together to the best possible advantage, unless especially blended by one who knows all the contents of the lacquer enamel. A great many low-priced reducers are now being offered to the trade, and some of them work entirely satisfactory under certain conditions but give

a great deal of trouble under certain other conditions. A case taken from actual experience will illustrate this.

The final coat of lacquer enamel on an automobile body was applied on a very damp morning, and instead of the finish turning out a nice blue shade, as it was supposed to be, it was a grayish white. A coat of thinner was tried to clear up this "blush" but it only made matters worse. On investigation it was found that the thinner being used was a low-priced one; upon substituting a high-grade thinner, a coat of it cleared off the "blush" perfectly so that a very high-grade finish was secured.

### Cause of Blushing.

The point is that a great many users of lacquer enamels have this trouble of moisture in the atmosphere blushing the lacquer more or less, and this trouble is caused as much by the use of a reducer, which is not so constructed as to hold the cotton in solution, as upon any other one thing.

Most users of lacquer enamels seem to have the idea that all thinners are the same, and that the difference in price is simply due to the fact that some people can get more for it than others. The truth of the matter is that the old adage, "you get what you pay for," holds true with lacquer reducers as with all other materials. To avoid trouble it is much better to use the reducer approved by the maker of the lacquer enamel, rather than to substitute something for it merely because it is cheap.

In this connection it is also well to remember that there is usually one type of reducer used for thinning surfacing materials made on a lacquer base, and another higher grade reducer used for thinning lacquer enamels. If the reducer intended for use in the surfacing material is used for the enamel, there will be a more pronounced orange peel effect and a greater tendency

Spray-painting equipment for refinishing automobiles. Baffles in rear of booths on left-hand side provide for an even distribution of exhaust throughout booths and also collect all solid particles suspended in the vapor.

toward blushing or turning milky white when the humidity is very high.

There is still another type of reducer used in special instances where it is desired for use in brush work, where small spots are patched up or where a stripe is applied with lacquer enamels. This reducer is a slower drying material than the ordinary lacquer enamel reducer for spray work, and it permits the lacquer enamel to be brushed over small areas.

**Remove Old Finish.**

The question is frequently asked if it is necessary to remove the old finish from automobiles before starting to use lacquer enamels. Experience has shown that the safest way is to always remove the old finish.

Where the customer will not stand the cost of completely removing the old finish, and the paint shop man is willing to take some chance on the final results, lacquer enamels can usually be applied over the old finish, although it should be strictly understood that there is always an element of chance when the old finish is not removed. This is explained by the fact that some paint materials are more quickly softened by the solvents in lacquer enamels than other paint materials. It really can not be said whether the old finish will give satisfactory results under a lacquer enamel or not, until a test has been made on that particular job.

**Clean the Surface.**

Regardless of whether the old finish is removed, extreme care should be taken to see that the surface is absolutely clean and free from all grease, wax, rust, water or similar materials, before starting to use the lacquer. In case the finish has been removed with liquid "paint and a varnish remover" containing wax, it is well to wash the body all over very carefully two or three times with gasoline, naphtha, turpentine or a similar solvent and finally, just before applying the primer, again wash the job thoroughly with a lacquer reducer.

Pay particular attention to cleaning around the mouldings, door hinges and similar places that are hard to reach. It is sometimes advisable to use a blow-torch to heat up these inaccessible places, and thus burn out any moisture, oil, wax or similar material that may be lodged in them. If the surface is not absolutely clean, lacquer materials will not adhere. Where the old finish has not been removed from the job, be sure that any wax, or similar material that may have been on the old finish, is thoroughly removed by washing with benzol, turpentine or some similar solvent, and by sanding or rubbing with pumice stone and water or sandpaper and water.

**Selecting and Applying Primer.**

Where the old finish has not been removed, it is advisable to apply a coat of primer before applying the lacquer materials, as this will insure a good bond to the old finish and will protect it from the lacquer solvents to a certain extent. A paint primer especially built for use under lacquer is always to be preferred to a primer built on a lacquer or pyroxylin base. A properly-constructed paint primer, when allowed to thoroughly dry, will have better adhesion and give a more durable job, which will be less likely to chip and flake off with age.

The primer should be put on

just as thinly as possible, and yet give a solid covering.

In other words, the main purpose of the primer is to serve as a bond or union between the succeeding coats and the metal itself. It will serve this purpose better if it is put on thinly, than if it is put on heavy. Furthermore, the thinner the coat the more complete will be the oxidation of the oil in the primer, and the less likelihood there will be of the lacquer solvents softening the primer and producing raised spots or blisters.

The primer should be thoroughly dry before any lacquer materials are applied over it, and in damp or cool weather or where there is not a good circulation of fresh air, more time should be given for the primer to dry than if the drying conditions are very good.

If a lacquer-type surfacing material is not desired, a great deal of care should be taken in choosing a paint surfacing material, as some of them withstand the action of solvents better than others. Some people make the mistake of choosing their surfacer from the standpoint of easy sanding. Apparently they forget the fact that the surfacer is the foundation for the finish, and if it is too short and brittle it will chip with age and spoil the entire finish. As a rule it is much better to use a surfacing material that sands a little harder but that has sufficient elastic properties to make it durable. It is better to use a surfacing material recommended by the maker of the lacquer enamel.

**Undercoats Are Important.**

In applying lacquer enamels be sure to put on a good, wet coat. Pile on all that you can and still not have sags, the idea being that the wetter coats you put on the more they will level out, and the less will be the orange-peel effect; less rubbing will be needed to produce a surface later on. These wet coats of lacquer can be used safely if the undercoats are thoroughly dry.

If the undercoats are not of the proper type, or are not thoroughly dry, the wet coats may have a tendency to soften up and blister them. In that case, the user will have to exercise his own ingenuity as to what to do. A good thing is to change to undercoats that have proven to be safe. Some people, however, put on one or two coats of lacquer enamel rather dry—so-called fog coats—before putting on wet coats of the material.

Sufficient coats should be put on to give a thorough covering. These coats should go on uniformly so that they are not thicker in some places than in others. Otherwise there will be danger of the color not being uniform when the job is rubbed and polished. All lacquer enamels are more or less transparent and unless the coats are uniform in thickness they will show a slight difference in shade. This is especially true of maroons, blues and the more transparent colors. In some cases it is advisable to use a ground color made of a lacquer enamel of more solid covering properties, before the finishing lacquer enamel is applied.

**Rubbing and Polishing.**

In most instances, the last coat of lacquer enamel should be allowed to stand at least 12 hours before attempting to rub. Various methods are used for rubbing out the orange-peel effect. Some people use especially made rubbing compounds; others use pumice stone and oil or pumice stone

and water. Perhaps the quickest system is to rub with fine, waterproof sandpaper and water; then apply a coat of practically all reducer with only a little or no color in it. This will practically remove the slight scratches by causing a thin film of colored lacquer to be flowed up over the pigment particles, thus giving a uniform luster which is sufficiently high for some work.

Where a still higher luster (approximating that of a finishing varnish) is wanted, it can be obtained much easier by this system than by attempting to polish directly after the rubbing operation.

For producing the polish, various materials are used. Some people use different kinds of trade-marked polishing compounds, but if nothing else is available, rottenstone and oil, or rottenstone and water, can be used with a great deal of success. Polishing should not be attempted until several hours after the final thin coat, as mentioned above, has been applied.

In rubbing, care must be taken not to cut through sharp corners, and such spots, or it will be necessary to patch these later on. The rubbing should be continued until practically all orange-peel has been removed, if the best looking job possible is wanted. Always rub in a straight line; it is wise to rub the hood in the same general direction as the body to make it match up better.

## Don't Mix Different Brands of Lacquer.

Though all nitro-cellulose materials have practically the same characteristic "banana-oil" odor, they are not the same in composition by any means. One manufacturer's solvent or thinner may be poison to the lacquer of another manufacturer. Each type of lacquer requires a thinner of a definite balanced composition for the best results. It is therefore advisable to use with any given lacquer material, the solvent or thinner that is recommended by the manufacturer of that particular brand of lacquer.

Further, in the case of a complete nitro-cellulose system for automobile finishing, it is better to use any one manufacturer's complete system than to mix his materials with those of another manufacturer. That is to say, do not attempt to use "A's" nitro-cellulose primer, "B's" nitro-cellulose surfacing materials and "C's" nitro-cellulose enamel, without first being absolutely sure of the satisfactory durability of the final result.

While it was seldom the best plan to mix the breeds of the old oil-type paints and varnishes, this could be done with far less risk of failure than is now the case with nitro-cellulose materials. I do not wish to go on record to the effect that all such mixed systems will be failures. It is perfectly possible that a particular arrangement may be wholly satisfactory, but I do want to emphasize that it is not a question to be decided by the average painter or finisher. It is purely a problem for the expert paint chemist and he should be consulted before a mixed system is attempted.—L. C. Hill.

### *Automobile Refinishing Equipment Folder.*

A new folder just off the press describes and illustrates the DeVilbiss spray-painting equipment for refinishing automobiles with pyroxylin or lacquer enamel materials. Copies can be obtained free by writing The DeVilbiss Mfg. Co., Toledo, Ohio.

# Modern Finisher Foremanship

*With a background of long service as finisher foreman, superintendent and production manager, the author gives some interesting facts and forms for use in finishing department management*

By M. L. Sinclaire

GENERALLY speaking, every departmental foreman in the factory thinks his position is the most difficult, but I think it can be shown that under prevailing conditions the position of foreman finisher is the most unenviable. Not only has he more to look after, and not only are his responsibilities greater than those of other foremen, but quite frequently he is handicapped from the very beginning, by inadequate provision of facilities for doing the work of his department.

All too frequently the factory has been planned by men who have absolutely no knowledge of the requirements of a finishing department. Very few men outside the finishing department know anything about its actual requirements. Perhaps this is because the work in this department is so different from other departments that very few men graduate from it to other lines of work.

All branches of woodworking are more or less closely related, but it is a long step from any branch of woodworking to finishing, and very few men take the step. Therefore, unless the finisher foreman is consulted when the finishing room is planned, this department receives anything but expert consideration.

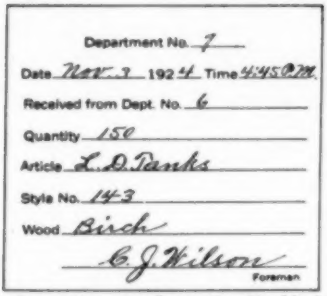
The great majority of finishing departments have too little space for the amount of work required of them. In the original plans a factory of a certain size is provided for. Very often provision is made for all other departments first, and the finishing department gets what is left. The finishing department, being the last to commence operations, is often encroached on before the others are satisfied. Even where consideration is given, it is usually theoretical rather than practical.

A certain amount of space is required to handle a certain quantity of stock. In normal times the department is working

| JOB No. | STYLE No. | WOOD | FINISH | QUAN TITY | DATE RECEIVED 1924 | STAINED | FILLED | SURFACED | 1st COAT | 2nd COAT | 3rd COAT | 4th COAT | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 143 | Birch | A. Mah | 150 | Nov. 3 | Nov. 4 | Nov. 5 | Nov. 7 | Nov. 8 | Nov. 11 | Nov. 14 | Nov. 17 | |
| 2 | 236 | Birch | Walnut | 200 | Nov. 4 | Nov. 5 | Nov. 6 | Nov. 8 | Nov. 10 | Nov. 13 | Nov. 17 | | |
| 3 | 194 | Walnut | M.R. | 100 | Nov. 5 | Nov. 6 | Nov. 7 | Nov. 10 | Nov. 11 | Nov. 14 | | | |
| 4 | 319 | Mah. | Burn. | 100 | Nov. 6 | Nov. 7 | Nov. 8 | Nov. 10 | Nov. 11 | | | | |
| 5 | 461 | Mah. | Mah. | 100 | Nov. 7 | Nov. 7 | Nov. 8 | Nov. 10 | | | | | |
| 6 | 164 | Walnut | A. h. | 150 | Nov. 8 | Nov. 10 | Nov. 11 | | | | | | |
| 7 | 140 | Birch | Walnut | 200 | Nov. 10 | Nov. 11 | | | | | | | |

Progress sheet kept by finishing foreman, and which shows the condition of every job on the floor.

to capacity; then for some reason the stream of work coming in from other departments is stopped for a day on account of some hold-up. Then it all comes in with a rush, like a flood of water from a broken dam. The foreman finisher is expected to handle it without any provision having been made for such a contingency—and handle it as though it had come in the usual steady stream.


Department No. 7
Date Nov. 3 1924 Time 4:45 P.M.
Received from Dept. No. 6
Quantity 150
Article L. D. Tanks
Style No. 143
Wood Birch
C. J. Wilson
Foreman

Foreman's receipt for goods. The blank form is filled in by the sending department and signed by the foreman of the receiving department.

The finisher foreman has more to look after than any other departmental foreman in the factory, and in most shops he has to carry every detail in his head. Several jobs are placed on the floor in one day, each to be finished in a different way. He gives orders to the stainers. Next day he must remember to have these jobs filled, and on the following day, or the second day after, these jobs must be shellacked and varnished.

A certain time must elapse between the different coats of varnish, and the foreman must carry these different operations in his head together with the dates on which they are to be performed. In the meantime each day has seen its quota of work coming into the department with the respective operations to be performed according to schedule—a schedule usually carried in the head of the foreman finisher.

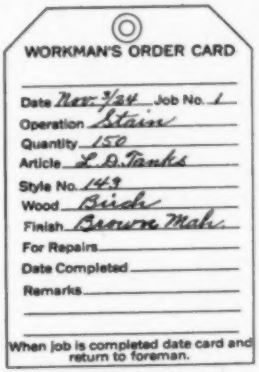
Imagine any office man trying to carry in his head a similar number of accounts, with their amounts and the dates due. No office manager would think of running the business end of a concern that way, yet many of them expect the foreman finisher to do as much, and more.

During my term as a foreman finisher I worked out a system which enabled me to keep a positive check on every job going through the department. I was forced to do this by the fact that we had over 400 different styles of articles and finishes to keep track of. On several occasions previous to the installation of this system I had been "put on the carpet" because of alleged neglect to start work on jobs within reasonable time after receiving them, and neglect to carry them through according to schedule.

My first move was to begin using a receipt book which showed the time and date on which goods arrived in my department. It had been the practice of some departments to rush certain goods to the finishing room just before quitting time, in order to get credit for them a day ahead. The management made no allowance for this in my case, when I had nothing to show what time the goods were received.

The next idea was a card system to enable me to keep track of the stock in process, without having to carry the details in my head. The receipt book was made in duplicate, carbon paper being used. I kept the original and placed it on file. Sometimes a

batch of goods would be divided into two or more kinds of finish, in which case I would at my convenience, make out workmen's cards for the different finishes, starting first with staining.


WORKMAN'S ORDER CARD

Date Nov. 3/24 Job No. 1
Operation Stain
Quantity 150
Article L.D. Tanks
Style No. 143
Wood Birch
Finish Brown Mah.
For Repairs
Date Completed
Remarks

When job is completed date card and return to foreman.

The workman's order card.

I had a set of pigeon-holes placed over my desk. There was one for each operation, and it was labeled. Into the pigeon-hole marked "Stain" I put the first cards after they were filled in. At the proper time these cards were given to the stainers. As each job was completed the card for it was returned to a file on my desk. As soon as convenient I made out a new card for the next operation. By going over the cards in the pigeon-holes I knew the exact condition of all the work on the floor. For a time the card system was a great help. Then we got a progress sheet which made it much easier to ascertain the condition of the work, but we retained the cards for use as workmen's order tickets.

The progress sheet is a perpetual and compact record of all the operations on each job; it shows at a glance the progress each job has made and the date of each operation. These entries were made each night, and all the new cards were made out before the close of the day in order to be ready for the workmen in the morning.

Each morning the workmen were given orders enough to keep them going all day so that no time was lost between jobs. The cards were made of ordinary shipping tags, and could be hung on a nail near a workman's station. They were placed in the order in which the work was to be done.

Every finishing department has more or less repair work, and every finisher foreman knows the difficulty of keeping track of it. The cards were a great help in this particular. The number of pieces sent in for repairs were marked on the card, then a repair card was made out to take care of this class of work. These repair cards were perpetual reminders, and they prevented these odd jobs from getting too far behind.

This system has been adopted by a number of the more progressive concerns. When it is understood and properly handled, it reduces the worry of the foreman finisher to a minimum. There is no need to worry about anything being overlooked or forgotten, because the foreman has the whole department before him on the progress sheet. Each workman has his orders before him in writing. The system was first used in a factory making a line of bath-room fixtures, but it has since been adopted in furniture, piano and automobile factories. It is simple and effective, therefore it is of great value to men who are not trained accountants.

# The Finish on Simmons Beds—II

*In this second installment the Chief Chemical Engineer of the Simmons Company describes several additional types and styles of iron-bed finishes and explains the processes by which they are obtained*

By E. W. McMullen

THE finishes which imitate very closely those of the various furniture woods have become very popular. The most common in demand are American walnut, brown mahogany and oak, but there are also frequent requests for red mahogany, Circassion walnut, French walnut, birch, gum, Bird's Eye maple, teak and many others. The proper reproduction of these finishes requires expert painters, called grainers, who operate according to the description following.

The beds are first primed and baked exactly as the enameled beds, either by dipping or spraying as the case may be. The color of this priming coat depends on the finish desired, as the succeeding coats are more or less transparent and this ground color shows through. There is much experimenting to be done to determine the best shade of this first coat, and it must be held closely to that shade to get uniform and pleasing results.

The most stable pigments only are used, such as burnt sienna, burnt umber, various carbon blacks, chrome yellow, etc. Each lot of raw material is tested for strength of color, fineness and shade before being ground into paint. This first coat is baked at an extremely high temperature—about 300 degs. F.—and this is allowable only because of the quality of the materials used in it, as they do not change perceptibly in color.

After baking, the glaze coat is applied, usually by hand with a sponge or brush. The markings or grain must be made by wiping away portions or lines in this glaze, allowing the undercoat to show more or less clearly. Also, a third color, such as black, may be applied by the graining medium, which is usually a compressed sponge with notches cut in it.

The accuracy with which a wood grain of any variety can be imitated by a good workman is really astonishing. Even those accustomed to inspecting it have to rap on some pieces before being positive whether the finish is real wood, or on steel. Of course, the length of time spent on any certain job determines the quality of the outlines produced—the higher priced articles being given more time. On some specially grained jobs, a second graining operation is necessary. For two-tone and antique finishes this is true—another glaze, graining operation and bake. The quality of finish, so far as wear is concerned, is the same in all cases.

After the hand operation in forming the grain is complete, the beds are again baked at the same high temperature as before. When cool, they are lightly "mossed" or sanded to remove any dust particles, and varnished.

The varnish is of two varieties. For the cheaper beds, the so-called flat or non-lustrous varnish is used, which, when baked has only a slight luster. This allows the rubbing to be completed quicker than if the varnish had a high gloss. The materials used in the two varnishes are very similar with the exception of the flattening agent. Those beds, on which the glossy or high luster varnish is used, require more rubbing and the finish is consequently more velvety than those coated with flat varnish.

Men at work doing hand graining with brushes.

The beds may be given one or two coats of varnish either dipped or sprayed—the choice being determined by the shape of the bed. Each coat of varnish is baked at high temperature, with a light sanding operation between coats.

After the final coat, whether it be one or two coats, the bed is rubbed with powdered pumice stone in either a special oil or water. The results are very similar but for some purposes a water rub is preferred, and for others, the oil rub. This rubbing is done by hand, usually with a felt pad, and it requires considerable skill and strength on the part of the rubber.

When a large flat surface occurs, as in large panels, etc., a special rubbing machine is used, operated by compressed air. The machine simulates the hand rubbing operation but it is much more rapid. The result is a beautiful velvet effect of great toughness and permanence. This is brought out by a final polish with our own special furniture polish and the bed is ready for packing and shipment.

**Vernis Martin Finish.**

This particular finish is still popular in some sections of the country, though it has been replaced to some extent by the more modern styles. It is applied in two ways—by dipping and by spraying.

For the dipped job, the bed is first coated with primer in the special form of dip tank previously mentioned, and then baked at the high temperature in automatic kilns. It is then dipped in "size" which is really a special varnish made for this particular purpose. This size coat is allowed to dry for a few minutes until it becomes slightly tacky. At the proper moment, these partially dry beds, mounted on a rack, are moved into a bronzing chamber and the doors closed.

A series of fans are started and a carefully-regulated quantity of gold bronze is dropped in through small pipes in the roof of the chamber. These pipes are distributed over the entire area, so that the air of the chamber is filled with flying bronze particles. As these come in contact with the

sticky surface of the beds, they are held like flies on fly paper, and eventually a complete bronze layer is formed, over the varnish undercoat.

It is quite a feat to have the "size" just sticky enough to hold the bronze, and yet soft enough to allow the particles to settle down flat instead of standing on edge, as will be the case if the size is too dry. The bronze also must be exactly right—of the proper fineness, and with just enough grease coating to allow it to sink into the size, yet not too much to keep it from baking hard.

The covering is completed in about three minutes. Then the beds are removed to the automatic high-temperature kiln where the bronze coat is baked on hard. In the old low-temperature kilns this used to take 10 to 12 hours, but the high-temperature does a really better job in 1½ hours. The almost solid coating of bronze makes the underneath film of "size" hard to dry, and the efficiency of the high-temperature bake is particularly noteworthy in this case.

The baked bronze is mossed off and coated with varnish. This coat will not stand as high a temperature as the previous one, as the wet varnish will effect the bronze more easily. It is hard and tough, however, and the combination such as described, known as "Vernis Martin" finish, is quite a lasting finish.

For the sprayed Vernis Martin, the bronze is mixed with a special liquid made for the purpose, and sprayed on the bare steel. This coat is thoroughly baked and then a coat of varnish is sprayed on top of it and again it is baked. This is very similar in looks and wear to the dipped and air-blown job. The reason for spraying is that some special shapes of beds cannot be dipped.

**Oxidized Copper Finish.**

In certain localities and for certain purposes, this finish is quite popular. The bed is first given a coat of black japan, thoroughly baked, and the oxidized effect is produced by spraying copper bronze emulsified in a special varnish liquid. This bronze is "spotted" in a regular pattern on various parts of the bed to produce a pleasing effect.

The black japan used at the Simmons Co. is a very special kind known as "water japan." The peculiarity of water japan is that it uses only water as a solvent for the japan base, and by so doing eliminates all fire hazard, due to the very high temperature (around 500 deg. F.) at which it must be baked.

Water japan must be applied in a special way; the article to be coated must be very hot (above 450 degs. F.) before the japan will "take" or precipitate on the surface. To accomplish this, the beds travel through an automatic high-temperature kiln until they reach the proper temperature (about 500 degs. F.). In addition to getting the metal hot enough to precipitate the japan, this burns off the slight oil film and leaves the metal very clean.

At a certain point in the kiln, the beds automatically drop down into the tank of japan where the dense black film is instantly deposited from the surrounding emulsion, which does not look black but brown. The beds go right back into the kiln and travel on to complete the bake, which is done very rapidly with this material—less than 15 minutes at 500

degs. F. The result is one of the best protective coatings that can be applied to steel; it is about the hardest, toughest and most resistant film, outside of a metallic plate, that is known.

When cool, the bronze spots are sprayed on, the beds are given a light bake, and the finish is complete. There are other "oxidized" finishes such as "ox. silver", "ox. blue", "ox. brown", etc., but these are applied with the various bronzes, gold, aluminum, etc., on different colored enamels.

**Brown Finish.**

Recently a demand has sprung up for something which would harmonize with the various wood finishes and yet be cheaper in price and wear just as well. This demand has been met with the Simmons "brown finish." A special shade and quality of brown enamel was developed which met all qualifications as to color, covering power and toughness. It is either dipped or sprayed on the beds, depending on their shape, and is baked at about 300 degs. F.; a finishing coat of flat varnish is applied in the same manner and again baked at the high temperature. The result is a very tough finish which wears as well as any of the regular finishes and harmonizes well with almost any wood. For some purposes it is very popular.

In conclusion, I may say that the above very brief description gives a faint idea of the detail necessary for the most important part of the manufacture of steel beds. The Simmons Co. believes that the results justify the time and effort necessary to obtain them, and while the enormous variety of articles finished in the various manners described are not perfect, yet they represent the best efforts at perfection that have been attained on steel beds up to the present time.

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## Minimizing Fire Hazard.

Wherever nitro-cellulose lacquers are used it is important to have the finishing room arranged so that there is plenty of light and adequate ventilation. Suitable provision should be made for removing the fumes (evaporated solvent) from the building both for the comfort of the workmen and the reduction of fire hazard.

The added fire hazard in the use of nitro-cellulose materials is due principally to the low volatility of some of the solvents used, and to their being sprayed in large volumes, and not to the nitro-cellulose itself. The vapors are much more inflammable than those from paint and varnish, though no more inflammable than the vapors from varnish remover or shellac.

Spraying should, therefore, be done in a separate room, if possible; or if not, in a booth equipped with an exhaust fan. Care should be exercised to have no open flame, gas burner, heater, stove or blowtorches used near the spraying operation. All electric contacts should be carefully protected and s h o r t circuits guarded against. Static electricity from belts should be carried away by proper grounding.

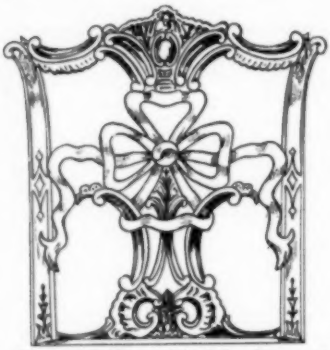
With proper care and regard for the inflammability of the vapors from nitro-cellulose lacquers, no trouble should be experienced —but it must be remembered that greater attention should be paid to the storage and use of these materials than with paint and varnish.—L. C. Hill.

# Period Finishes—Chippendale

*Wherein the author directs special attention to a Chippendale style of chair, and mentions other work so distinctive of this famous cabinet maker*

By R. J. Meade

OUTSTANDING among the distinguished furniture designers of the Georgian Period was Thomas Chippendale (1708-1779). He came to London with his father in 1727 and an original bent early showed itself in the publication (1754) of a book of designs, "The Gentleman and Cabinet Makers Directory". The first furniture catalog ever issued, it sold for the unprecedented price of $16.00 and was eagerly sought for by cabinet makers and nobility alike.



Distinctive Chippendale design known as the "ribband" back chair.

Unlike some of his contemporary rivals Chippendale was a manufacturer as well as a designer and his shops turned out a profusion of beds, secretaries, desks, tables, cabinets, side boards, sofas, bureaus and dressing tables. Chairs, however, were his specialty and he originated a variety of distinctive types originals of which are highly priced wherever antiques are collected.

Chippendale combined structural soundness, lightness and grace to a degree of success never before accomplished. In style he drew inspiration from three principal sources—the cabriole leg and claw foot from Queen Anne, rococo from Louis XV, geometrical forms and foils from Gothic and square fretted legs and pagoda cabinet tops from China. Hence we have English, French, Gothic and Chinese Chippendale all quite distinct.

The association of mahogany with Chippendale grew out of the fact that the duty on the importation of these logs was removed in 1833, about the time Chippendale was starting his career. The flexibility of this wood so appealed to his love of curves that he employed it to the exclusion of every other wood. He relied on carving for ornamentation—little turning was employed; he had no use for inlay, marquetry, gilding, painting and lacquering.

Perhaps the most distinctive Chippendale design is shown in the illustration. It is known as the "ribband" back chair, the carved splat showing a knotted ribbon with four loops. Every consideration for comfort as well as beauty is shown in Chippendale chairs, the seats being square cornered, well upholstered, broad in size and tapering gently toward the back.

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(Substitute)

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With Paasche Air Finishing Equipment you make a big hole in your labor costs, you save valuable floor space and your finishes are finer than ever.

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The cabinet makers of that period finished their work by the French polishing process. A soft rag was rolled into a ball, dipped in linseed oil, then into shellac or gum arabic or gum sandarac, or a combination of these, and rubbed on the bare surface with a circular motion. When the first application was dried a second was made and so on until the pores were filled level with the surface. The remainder of the finish was built up in the same way— a very tedious and long drawn out process as compared with modern methods.

The present day practice is to sponge the wood thoroughly with clear water, sand down the raised fibres, dust off and apply a coat of reddish brown water stain. The stain may be mixed from combinations of brown, orange, yellow and black anilines or secured ready made under the standard trade term of Adam mahogany. From three to five ounces to the gallon is the customary solution strength, depending on the brands used.

The grain will again be raised but to avoid cutting through the stain in sanding the surface is given a thin wash coat of white shellac. This stiffens the remaining fibres and makes it easy to knock them off with fine paper. Red mahogany paste wood filler is then applied, followed when hard dry by shellac and two or three coats of varnish, or by three or four coats of body lacquer, in both cases rubbed to a dull, semi-gloss finish.

## Removing Paint and Varnish.

In removing the varnish coats with only benzol removers, we keep the surface good and wet without much brushing until the coats are soft; then scrape off and wipe up with sea moss or "Fillrub," using 50 per cent. naphtha and 50 per cent. denatured alcohol as the final wash coat.

Where we wish to remove the filler and stain coats we use a brush scrubber with the varnish remover, wiping off, as above, all the old finish. Now give a good coat of remover and while wet, wash with strong ammonia water, using brush scrubber after which rinse off with clear water. While wet apply wood bleach which restores the wood back to its natural color.—Edward C. H. Rottmann.

## Acts as a Masking Material.

Under the trade name of "Protect-O-Lac," a new product is now being marketed by the Continental Sales Co., Temple Bldg., Chicago, which is claimed to effect a saving in masking portions of work which it is not desired to spray.

"Protect-O-Lac" is applied like paint to the parts of surface not to be sprayed, and is said to fully protect same while the finishing material is being sprayed to the exposed surfaces. Following completion of the coating, this masking material is easily removed by simply peeling off film and polishing surface with a dry cloth.

"Protect-O-Lac" is said to be non-drying and non-solvent, and that it does not contain acid or other injurious substances. Intended primarily for use in automobile finishing where the spray painting system is used, it is claimed that this masking material can also be used successfully on various other spraying jobs where two-color work is done.

# Industrial Finishing

PRACTICAL PUBLICATIONS, Inc.
Publishers
210 Holliday Building
Indianapolis, Ind.

Issued monthly. Distributed exclusively to executives and foremen finishers in all kinds of industrial plants where finish coats are applied.

JULY, 1925


### *Buying Finishes Today.*

To the outsider the buying of finish looks easy, so easy indeed that it scarcely can be considered as a matter of business. But to the man who does the buying for a manufacturing concern, the transaction has an entirely different aspect. There is one way in which the matter can be greatly simplified. It is to buy only from strictly reliable makers whose brands carry the insignia of quality, being well known on the market.

Cheap or bargain-counter varnish, for example, is not always at its price, a well-filtered or aged varnish. There are dregs in varnish that must be removed by the filtering process. Even in cases where cheap varnish is filtered the work generally is inferior, not being properly done owing to the cost of the process. Thus in buying cheap finishes, because they are cheap, one not only gets poor wearing qualities from them, but dross or "pebbles" will probably show up in the finished surfaces.

Then the ripening process is slighted if not ignored entirely in the case of a cheap grade of varnish. Very likely it is only a few weeks old when purchased. Even a poor varnish is made the better for aging or ripening. These are some of the essential features concerning varnish buying that every buyer ought to know about.

### *Address Your Mail Correctly, Clearly and Completely.*

Modern business demands the rapid and efficient transmission of mail, and the U. S. Government has organized and is maintaining a marvelously well-trained and remarkably honest organization for carrying on this service. However, the prompt and efficient transmission and delivery of mail matter depends on the durability of the wrapper and the clearness, correctness and completeness of the address, and the return address. The sender of every piece of mail desires that it be dispatched promptly, and if the individual or concern to whom it is addressed is not at the location specified, he desires it returned unopened just as soon as possible.

A letter, postcard, parcel, or publication entering the mails is simply a piece of mail. If, because of inadequate or incorrect address—and in the case of a package, improper wrapping—a piece of mail must be taken out of the regular postal machinery for directory service or "hospital service", it becomes a "nixie." If the postal sleuths are able to correct the address, or return it to the sender for a better one, it again becomes a piece of mail, but it is delayed mail. If, after an exhaustive effort, the postal "detective" must give up the puzzle, and if he finds no return address, the piece of mail is consigned to the Dead Letter Office where it is opened in the hope of finding a return address.

When you are informed by the

U. S. Postal Department that 21,000,000 letters and 803,000 parcels went to the Dead Letter Office last year; that 100,000 letters enter the mail yearly in blank envelopes; that $55,000 in cash is removed annually from misdirected envelopes; that $12,000 in postage stamps is found in a similar fashion; that $3,000,000 in checks, drafts and money orders never reach intended owners; that the U. S. collects $92,000 a year in postage for the return of mail sent to the Dead Letter Office; that it costs the U. S. $1,740,000 yearly to look up addresses on misdirected mail—knowing this, will you not feel inclined to be careful, and use your influence wherever possible to make others careful, in the wrapping and addressing of mail matter? It will prove helpful to all concerned.

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### *Faulty Foremanship—Faulty Finishing.*

A very important and valuable piece of work in process of finishing was spoiled recently because an assistant foreman called away the finisher to tell him something that really was insignificant, and which could have awaited completion of the work. The minor executive was inclined to be too domineering and prone to manifest authority where it was uncalled for. Naturally, when he beckoned the finisher peremptorily there was nothing to do but obey, the employee leaving his work only partly finished.

Often there is much spoilage at various finishing operations, because operators are interrupted unnecessarily. The operator will have his thoughts concentrated on the immediate work, only to have someone call him away. While some of these interruptions are not much in themselves, nevertheless they interfere with that careful, steady attention which is necessary to bring out accurate, perfect work. Therefore defects in one form or another are usually the result.

Work of any nature, whenever possible, should not be interrupted. Sometimes plates or other articles undergoing drying are as a consequence kept in the ovens too long, to inevitable damage. At other times, where a man resumes a given operation, a temporary interruption may reflect itself in one way or another in poor work, which undivided attention would have forestalled.

---

Wood lacquer must have great body and must have freedom in sanding and rubbing.

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A good many lacquer solvents are excellent paint and varnish removers.

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### *Young Spruance Dies.*

William Hennings Spruance, eighteen years of age, son of Gilbert Spruance, president of The Gilbert Spruance Company, Philadelphia, died June 2nd, after an illness of two weeks.

William was an honor student in the class of 1925 of the Germantown high school. His loss will be felt by his many friends, who extend their sincere sympathy to his family.

---

### *T. P. A. Honors Lindeman Representative.*

W. W. Burgess, known as "Bill" among his wide circle of acquaintances, who represents the Lindeman Wood Finish Co. in the High Point district, was recently elected state president of the T. P. A. Mr. Burgess attended the National convention at Birmingham.

Mr. Jay Mullies, general finishing superintendent for the Tomlinson Chair Mfg. Co. plants at High Point, recently visited the Lindeman Wood Finish Co. at Indianapolis while on his way to the Grand Rapids and Chicago furniture markets.

# Modern Filler-Room Practice

*Factory superintendent of Leopold Desk Co. compares former materials and methods with those in use today, and emphasizes the importance of quality materials, intelligent workmen and production planning*

By Arley E. Jones

THOSE who have been interested in woodworking for a period of 35 years or more can remember many changes in finishing materials and methods. Before the present method of filling came into use the old-time finisher, when he desired a transparent finish, filled the pores of wood with what was known as scraping varnish. After the color stain was dry, he would coat with this scraping varnish, dry and scrape off down to the surface, continuing until an even surface was obtained.

When the writer served a few months as a "stink-finger", as the boys in the filling room were known to the cabinet makers and machine operators, the foreman finisher made up the filler we used. His material was cornstarch, linseed oil, japan drier, colors and some varnish. He would make up a batch that in his judgment would make a day's run. It was a sticky mess, hard to clean off, and after a few weeks the cornstarch would shrink and the finish would drop.

Applying filler with brush

When the "Patent Filler" as the Wheeler filler was called (it was named after the inventor) came on the market a great change for the better came in the finish produced by the factories of those days. Reliable, easy-working fillers, with a base of silex is now produced by many manufacturers of finishing materials.

The foreman finisher should not be handicapped in the choice of finishing material by the purchasing department. A cent or two per pound of filler is often lost many times over in the cleaning-up and results obtained through the use of poor material. The writer has found after 25 years' experience as foreman finisher and plant superintendent that the best is the cheapest in the long run.

Neither do I believe that with the many details requiring his time and attention that the foreman should waste his time making up his own filler. It is impossible to purchase raw material and mix in small batches as good filler as can be purchased from the many reliable manufacturers of this material.

Some finishers are slow in adopting new methods or mechanical devices, perhaps from their training. However, with the shortage of men during the war

period, manufacturers and their foremen welcomed the advent of spraying apparatus, the rubbing machines and finish dry kilns.

The filler room, however, has been neglected partly because the usual employment departments of most factories have had the idea that anyone with a strong back and a weak mind could do the work required of the filling gang. If the real importance of good filling—the foundation—were realized, a better class of workmen, no doubt, would be hired for this important work.

Rubbing off surplus filler with sea moss.

High-class finishing can only be done when strict attention is paid to the foundation on which it is built. We read in the Holy Book of the foolish man who built on the sand, and the wise man who built on the eternal rock. The one, when the storm came his house fell, the other was

## Chemistry and Wood Finishing.

To safely combine dyes or chemicals for wood finishing, requires a knowledge of chemistry. Some dyes will not blend with others, and one chemical may react against another.

Foremen cannot be expected to have this technical knowledge, and at the same time be efficient managers of their department.

Such problems should be left to specialists. W. D. Lockwood & Co., do nothing else, and factories using their stains and dyes, can rely on getting correct, practical information and service.

Every foreman finisher should have their catalog at hand, and can obtain a copy by writing them at 314 W. 14th St., New York City.—Advertisement.

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happy because his house had a firm foundation. Just so in finishing.

While visiting a large factory, where efficiency was supposed to be the watchword, I was surprised to see each man in the filler gang place a piece of furniture on a bench, stir up a pot of filler and daub on the filler in the manner of an old lady whitewashing a hen-roost; then he immediately wiped it off with very coarse excelsior. Here were two mistakes, first very poor workmanship, second no efficiency.

To get a good finish job, filler should be cut not less than 12-lbs. to the gallon of solvent, using accurate scales and measures. This is for oak, mahogany and walnut.

Best results are obtained by brushing on, as when sprayed or dipped the filler has a tendency to dry on top, thus leaving it soft under a film. After brushing, it should stand until the gloss disappears—usually five to seven minutes. It can then be rubbed across the grain with a piece of hard felt glued to a hand block. Clean up with sea moss or some soft fiber. Final cleaning is done with rags, a picking stick and rubbing brushes.

Mahogany seems to be the hardest of all woods to fill. The little round pores of the wood must be filled, or when varnish is applied pinholes will show up.

On large surfaces, such as table or desk tops, when full bodied-up coats are desired, good results follow a double filling; this saves varnish coats. The first filling should be dry—not less than 24 hours when air dried,—when the second filling is done in the same manner as first filling. Finishers

who have never tried this will be surprised at the excellent results.

Some finish manufacturers are now shipping all filler in metal cans, as wood containers open up in warm air and the oil is lost, thus causing the filler to dry out.

The lacquers that are coming into use present new problems for the filler room. Silex, which is used in making filler, does not absorb oil or color, the color simply forming a coating around each little particle. The solvents used in lacquers bleach out the color, leaving the silex white; a gray pore is the result, producing a faded out appearance. This is more apt to happen if the filler is not dry. When piling is done with strips laid across filled surfaces, the filler does not dry and parts so piled will have a white or gray line, the size of strip used.

To speed up work in the filler room in plants where the Ford idea of production has not been adopted, a good working plan for the filler crew is to have part of the crew fill up all benches while one or more weigh out the paste filler and mix. As soon as filler is ready then one or two can brush on the filler, followed by others rubbing in the filler across the grain; by more of the crew cleaning up with sea grass, burlap scrap or fiber—the final cleaning to be done by the best men in the crew.

When the first bench is empty it can again be loaded up and process started over. If the crew is divided into proper units this plan is quite efficient, as there is no duplication of effort or changing of tools. In plants where the product is such that it is possible to do so, a continuous line can be formed with a conveyor moving

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in one direction and stopping at points a few seconds or a few minutes, as the case may be.

## Experience With Stains.

A finish started with an oil stain is in certain cases an unsatisfactory finish, especially if used on soft woods or woods that do not require filling. In such cases the wood absorbs a large amount of this oil stain, especially if the dipping process is used, and later on it may sweat through the succeeding coats of finishing material and destroy same. The goods finished with such oil stain will, in many cases, lose their original color and fade very fast if exposed to light. Another feature of oil stain is that the coats of finishing material which are applied over same may not hold on to the surface of the wood so well. The finish is more likely to chip off and mar very easily. This condition is due to the presence of a certain amount of stearic acid or wax in certain oil stains. The condition of using an oil stain on hardwoods, or porous woods which require a filling after stain, is not so serious; the filler, if applied directly over the oil stain, will remove a great deal of superfluous stain and also a large part of the grease or oil, therefore making it safer for the following coatings.

The only disadvantage I see in a water stain is that it requires an extra sanding operation, but the difference in cost between water and oil stain and the other advantages of a water stain are more than enough to offset the extra cost of this sanding operation. I know of cases where the difference of cost between a water and oil stain was enough to pay for this extra sanding.—F. R.

# Questions and Answers

*This service department is conducted to meet the readers' need for prompt information on specific problems, and to give others an opportunity to review the questions and to offer comments, suggestions or answers*

## Methods of Imitating.

What is the best and cheapest method of imitating walnut and mahogany over log-run gum.—A. F. Co.

## Canoe Refinishing.

I wish to inquire if you could furnish me with the following information: The best procedure to remove finish from canoes and similar surfaces; how to refinish such surfaces to prevent cracks and checking.—G. F. H.

## Silver Gray Stain.

We are particularly interested in Silver Gray stain and our trouble is making a Silver Gray finish where part of the wood is bent in a steam retort and finish it the same color as the other portion that has not gone through the retort.—E. H. S. M. Co.

## Wants Stain Formulas.

Can you oblige me by giving me a good formula in both water and oil stains for an old maple effect on maple and birch, also an old walnut effect on walnut; also any other shades of old effect on mahogany and oak, etc? —J. C.

## Lacquer on Fixtures?

I would like to have some information on finishing show cases, drug and bank fixtures. It seems as though the spray and lacquers have not reached this work as yet. If so, would like to hear from some one who is using them, whether successful or not.

Would also like to know about the proper application of undercoats and enamel on wood. I have been giving the wood two coats of enamel undercoat and two coats of enamel, but it has been scaling off, which I cannot account for.—Alvin L. Price.

## How is "Plastic Wood" Finished?

Does "Plastic Wood" (a preparation for repairing marred surfaces) require a filler or priming coat, before being painted with oil colors mixed with turpentine? I expect to use an air brush. I should think it would depend on the amount of compression that the plastic wood had been subjected to, in the process of moulding. "Plastic Wood" is such a new product that I will welcome any information concerning finish in connection with its use.—R. B.

## Tumbling Enamel Finished Handles.

We are inquiring whether or not it would be possible to obtain information regarding the tumbling of enamel on small handles. We have some customers who are desirous of having this finish on their handles and we have been able to tumble on stain, shellac, and fillers, but we are unable to tumble on the enamel, either lacquer or baking enamel. We would be pleased to have you

advise us whether or not you could supply us with information regarding same.—K. Handle Co.

## Enameling Glass Vases.

What method is best to enamel the insides of glass vases with various colored lacquer enamels such as black, old rose, etc.? The vases are clear glass, ranging in shapes and sizes, approximately 10 to 12-in. deep, 5½-in. dia. at bottom and 3½-in. hole at top.—B-D Co.

## Producing a Metallic Screen.

Here is a problem that has been put up to me for solution and I am asking your advice. I do not find any particulars regarding this subject. I am in touch with the motion picture industry and have received a letter from one of their research men, where he tells me that he wants to apply a mixture of Aluminum and Gold to a wood surface; his idea being to produce a metallic screen. He does not want the surface to be too highly glazed, but at the same time it must be smooth.—J. M. L.

## Acid-Proof Enamel.

In the June number of this journal, R. M. F. Co. inquires about an enamel for use on doors and other interior woodwork which will withstand acid. It is also stated they prefer an enamel that can be applied with a brush. I doubt if these conditions can be met. Lacquer is about the only acid-proof finish on the market today, but it cannot well be applied with a brush to large surfaces such as doors. An enamel can be made with lacquer, and I imagine some of our manufacturers are doing this. In any event a foundation made with undercoaters of the desired shade of color and coated over with lacquer will produce an acid-proof finish. The undercoaters should be applied in several thin coats and allowed to dry perfectly hard before applying the enamel. I would suggest, however, that the R. M. F. Co. take the matter up with the advertisers in this journal who may be able to solve the problem for them, and give them a clearer white enamel than can be made with undercoating and lacquer.—L. G. B.

## Cementing Leather to Iron.

In reply to question of C. P. in May issue: Take 10 lbs. cut shellac and in proportion 60 drops of pine turpentine to the quart, well stirred. Apply shellac to metal a few inches at a time, starting at top. Apply leather and roll out as you go. Roll leather with a downward stroke.—S. M. Christie.

## Wood Dust in Pores.

Replying to B. F. H. who asks in June issue if fine wood dust left on the surface before staining will prevent a good filler job if it is worked into the pores, I would say no provided there is only a little of it. If the pores are filled with dust a good deal of brushing is required to work it out and mix it with the filler. Unless it is thoroughly mixed with the filler and there is sufficient oil in the filler to take care of both the dust and silex, and bind them together, a real good filler job could not be obtained. But if there is only a small amount in the pores it can do no harm.

To be more specific I would say that the dust left on stock as it

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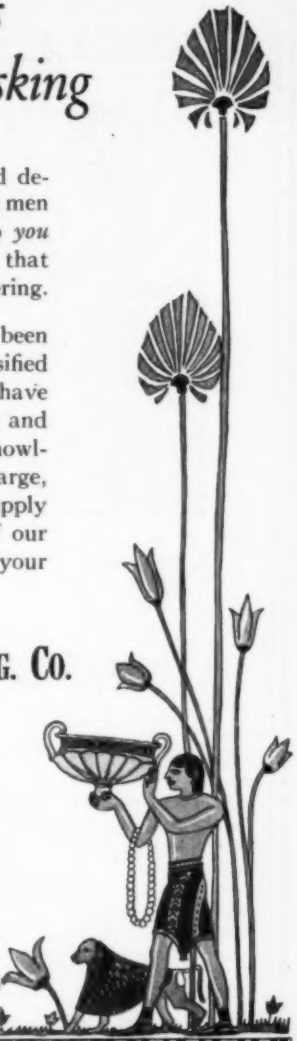

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comes from the sander is not apt to do any harm, but if the stock stands for several days and accumulates dust, then this must be cleaned off before the stain is applied, or before filling in the event the filler is applied to the bare wood.—M. C. B.

## Silver Gray Stain.

In June INDUSTRIAL FINISHING, P. A. W. Co. asks for a good formula for Silver Gray finish. In the same issue I. F. gives a formula for the stain, also details for making the finish. It is not always possible to get the desired gray with ebony crystals. A good formula for gray stain is as follows: Dissolve in two gallons of hot water, 1 oz. sulphate of iron, 4 ozs. sulphate of soda, 1 dram jet nigrosine. Brush the stain well into the wood and allow it to stand about fifteen hours. This time is necessary as the stain works slowly. Sandpaper with fine paper and finish in usual way.

The shade of gray may be changed slightly by adding a little orange color, or by varying the proportions of nigrosine. The depth can be varied by using more or less water.

This stain may be used on either oak or maple. If a dark shade of gray is desired on maple it will help deepen the color if the wood is first given a coat of tanic acid, about 1 oz. to a gallon of water, and when dry apply the stain.—Chas. P. Connor.

## Shellac Over Varnish.

In June INDUSTRIAL FINISHING, a correspondent asks for information regarding the practicability of making a finish with shellac over varnish. He says he knows a finisher who claims to be finishing with two coats of shellac over one coat of varnish. It can be done, but the method has no advantage over three coats of varnish.

I have done a great deal of experimenting with shellac over varnish for other purposes, and have discovered that unless the varnish is thoroughly oxidized (hard), the effect of the shellac will invariably be to cause both shellac and varnish to crack. Most painters know that a coat of quick-drying first coater, or undercoater, applied over a coat of enamel that is not hard will cause both to crack. The same will take place with shellac applied over varnish.

How I came to do some experimenting along this line may be of interest and profit to readers of this magazine. Some years ago I was in a shop that had its share of checks in veneered work. Everything appeared to go along all right until we came to rub the varnish, then the checks would open and the rubbing oil would ooze out of the checks. For a time we scraped the varnish off and re-finished, taking care to rub the stock before the varnish was hard enough to crack or check. This involved a lot of work and I knew if something could be applied to neutralize the oil I could re-finish without scraping off the old varnish. I knew the reputation shellac had for causing varnish to crack and also that shellac would neutralize the oil. The shellac would not render the varnish more difficult to remove so I decided to try it on several pieces, with the result that some cracked and some did not. In searching for a reason for this I observed that only those which had been varnished for some con-

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siderable time had not cracked. Further experiments showed that by having the varnish perfectly hard before applying shellac no bad results followed and I could re-finish without removing the old varnish.—W. P. Severne.

## Removes Baked Enamel.

In answer to the M. B. Co.'s inquiry in the May issue of INDUSTRIAL FINISHING, for an acid or chemical to remove enamel from old fenders, hoods, etc., I would like to suggest the following:

Fill a vat with a concentrated solution of ordinary lye and water. The greater the concentration, the faster the action. If steam coils are installed to heat the solution, the action will be still faster. In this case, however, provision should be made to carry off the fumes.

It will be found that the average paint job will remove in a few hours, while baked enamels will take as long as several days. —H. J. Boll.

## Why That Varnish Pits.

A careful reading of the A. M. P. Corp. inquiry, page 36, June issue, convinces me that the pitting in the varnish is caused either by water or oil in the spray line. Water in the spray line gets there by reason of the fact that there are changes in the relative humidity and temperature of the air under pressure, and the moisture in the compressed air therefore condenses on the inside of the pipe in which it is carried.

Oil gets into the air line through the compressor. These foreign products in the air line will, of course, shoot out on the surface to be finished with the air, or be mixed with the varnish; either will cause more pitting. The more oil or water there is in the line, the more pitting there will be in the finish.

In order to overcome this trouble, I would recommend an oil or water separator which can be bought from any of the spray equipment companies, or it can easily be made from a piece of 4-in. iron pipe, about 3-ft. long. This pipe should be capped on both ends and placed in an upright position. The incoming air should be admitted through a hole that is tapped in the lower end of the pipe, a few inches from the bottom. The outgoing air should come through a pipe that is

## Staining Fine Veneered Work.

To avoid the risk of injuring the glue, some factories use alcohol or oil stains although they are inferior to water stains in fastness to light, depth of color, and brilliancy.

To meet this situation, W. D. Lockwood & Co., have perfected a series of mahogany stain powders that dissolve in a mixture of equal parts of water and alcohol.

These stains have all the desirable qualities of the best water stains, but do not raise the grain as much, and are less liable to affect the glue, because alcohol is not a glue solvent.

They can be finished with shellac, varnish or lacquer. The drying of the filler is not retarded, and less sandpapering is needed to obtain a smooth surface.

Foreman finishers can get further information or samples, by writing to W. D. Lockwood & Co., 314 W. 14th St., New York City, asking for their "New Process Mahogany Stains." — Advertisement.

tapped into a hole in the top cap. The bottom cap should then be tapped and a petcock screwed in, so that water and oil may be drained off from time to time. A 60 to 100 mesh screen should then be fitted into the pipe, a few inches from the top. The space between this screen and the bottom of the pipe may be packed with excelsior by removing the bottom cap, which is then replaced.

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$2.00 extra for red light current heat indicator attached. F. O. B. Chicago.

Furniture Patchers' Knives, $.55; Furniture Patching Cement Sticks, $1.75 per dozen; Furniture Patching Transparent Sticks, $2.00 per dozen.

A new adjustable handle rest prevents wooden handle of knife burning while being heated. A rust-proof and scale-proof oven is mounted on an asbestos base. Furnace is strong, solid and well made throughout. No. 51 or 52 oven has knife opening 2¾" wide, ¾" high, 7½" oven. No. 5 or 50 is 1 $\frac{1}{8}$"x $\frac{1}{8}$"x5". Both complete with cord and plug.

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This arrangement will clean the water and oil out of any air line. It should be placed as near to the spray as possible.

In addition to the pitting there also seems to be trouble with a non-uniform flow. The chances are that your guns are held either too far from or too close to the work. Start at one end of the surface being finished and go clear across the work with even, sweeping motions. Be careful to hold the nozzle of the spray gun the same distance from the work at both the beginning and the end of each stroke, overlapping each spread about an inch or so.

It is also possible that incorrect air pressure on the guns might cause trouble. I do not know just what type of varnish you are using or what kind of guns, but a varnish that sets up rather fast will flow out better by using a higher air pressure, or it may be necessary to thin down the varnish a trifle to bring it to the proper consistency for spraying.—H. J. Turleman.

## For Washing Off Pumice.

In the June issue details are given of a tank used in one furniture factory for washing pumice from small articles after they have been rubbed.

In another furniture factory a system is in use for washing pumice from larger articles such as dressers, buffets, etc. It is a large booth like that used in spraying, with a cement floor raised slightly at the front and a gutter at the back to carry away the water. When the article has been rubbed it is pushed into this booth and the water applied by means of a hose. Using an adjustable nozzle the water can be applied with any desired force.

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the surplus wipes off easily, leaves the surface smooth, obviates the necessity of sanding and thus effects a saving in labor.

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If varnish is not thoroughly hard at time of rubbing the pumice is apt to stick a little if allowed to dry before washing which necessitates the use of a sponge to loosen it, after which the water from the hose will wash it thoroughly clean.

This method is finding favor in automobile shops and piano factories in cleaning off prior to applying the flow, or finishing coat, as it makes a cleaner job than can be done with the sponge and pail, and without making the floor sloppy where the men work.—B. M. C.

## Keeping Brushes Soft and Clean.

Some finishers and painters have trouble in keeping their brushes in good condition for clean work, and at the same time keep them soft and resilient. There is really no good reason why anyone should have any difficulty in this respect.

When varnish brushes are not in use they should be kept in turpentine. Bore a small hole in the handle, and in this hole insert a small screw. Use a covered "keeper" partly filled with turpentine. Set the varnish brushes in this, with the screw resting on a bar provided for the purpose on the inside of the "keeper," so that the hair is immersed in the turpentine without touching the bottom. Never leave brushes in varnish over night because a skin may form on the varnish and about the brush. For the same reason varnish should not be left exposed to the air over night.

Shellac brushes should be kept in wood alcohol. Neither turpentine, naphtha, nor water should be used in connection with shellac brushes. Alcohol is the solvent

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used in shellac, and is the only suitable liquid for cleaning and preserving the resiliency of shellac brushes. Paint brushes may be kept suspended in water, the same way as recommended for varnish and shellac.

If brushes are not well cared for in the way suggested they become "lousy". They become filled with small particles of dry material. If the hair of a brush is only partly immersed in liquid the air solidifies the varnish or paint, and when the brush is again used this hardened material breaks up into small particles. It is a most difficult thing to clean a brush that has once been allowed to get in a lousy condition, but it is easy to prevent it from becoming so.

Never wash brushes in a strong alkaline solution; to do so will destroy their resiliency. Hair is an animal substance and it is very susceptible to alkalies, as are all animal substances.

The resiliency of brushes used in water stain may be made more permanent by keeping them over night in a tin of paraffin oil. At the end of the day's work wash the brush in clear water; then dip in the oil, leaving it there until it is needed for use the following morning. When it is again required for use knock out as much of the oil as possible, then wipe the hairs well with a clean cloth. The first brushful of stain should be worked out on a board kept for the purpose; after this there will be no bad effects from the oil.—W. L. Onslow.

---

The protection afforded by proper coatings of paint or varnish is no longer a luxury; it is a necessity.

AT LAST! A REAL TIME SAVER

**PROTECT-O-LAC**

NON DRYING ——— NON SOLVENT

*—for—*

Masking windows, nickel-plating, radiator shells, fenders, two-color work, etc., in shops or plants using Spray Equipment.

Lacquer or other materials will not stick to **Protect-O-Lac.** Instead of becoming tacky the materials being sprayed will form a film when sprayed on **Protect-O-Lac,** and may be removed by simply peeling off film, and polishing surface with a dry cloth.

**Protect-O-Lac** is easy and quick to apply, just apply it like paint and spread well. It is a great labor saver and an absolute necessity in every plant using the spray system.

**Protect-O-Lac** contains no acid or injurious substances.

**½ Gal. $3.25 - 1 Gal. $6.00**

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**CHICAGO TEMPLE BUILDING - - - CHICAGO**

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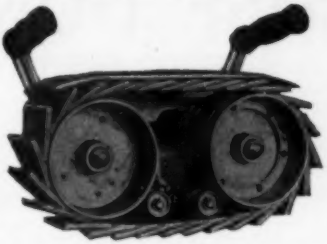
### The A & T Rubbing Machine



A self contained unit, light weight and simple construction. Ready to run when unpacked and set up. Power secured from nearest electric light socket.

It is easy to operate, very fast and produces a fine finish on lacquer or varnish. It will not burn finish and no time is lost breaking in operators.

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Machine will pay for itself in labor saved in a few weeks.

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IT CUTS TO A DEAD-LEVEL SURFACE

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**A SUPERIOR SUBSTITUTE FOR SHELLAC**

Don-o-lac will mix perfectly with any wood finishing lacquer without curdling.

It is also an excellent builder.

These features in addition to price economy make Don-o-lac an ideal material for your operations.

To substantiate our claims we are willing to send you a five gallon sample at the barrel price.

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The scorching summer sun, which takes the life out of the ordinary finish, will not injure an Arcozon surface. Our technical department will be glad to supply you with complete information.
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ON HANDLES—broom, sweeper, duster, mop, hoe, rake and similar handles—run your output up to four and five thousand handles per day as the productive labor of *one* operator with each complete unit of the

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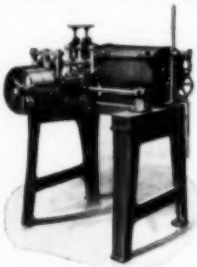
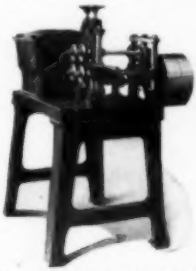


No. 86 Patent Adamant Filling Machine for filling handles preparatory for polishing and finishing.



No. 97 Patent Polishing Machine for polishing handles.

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